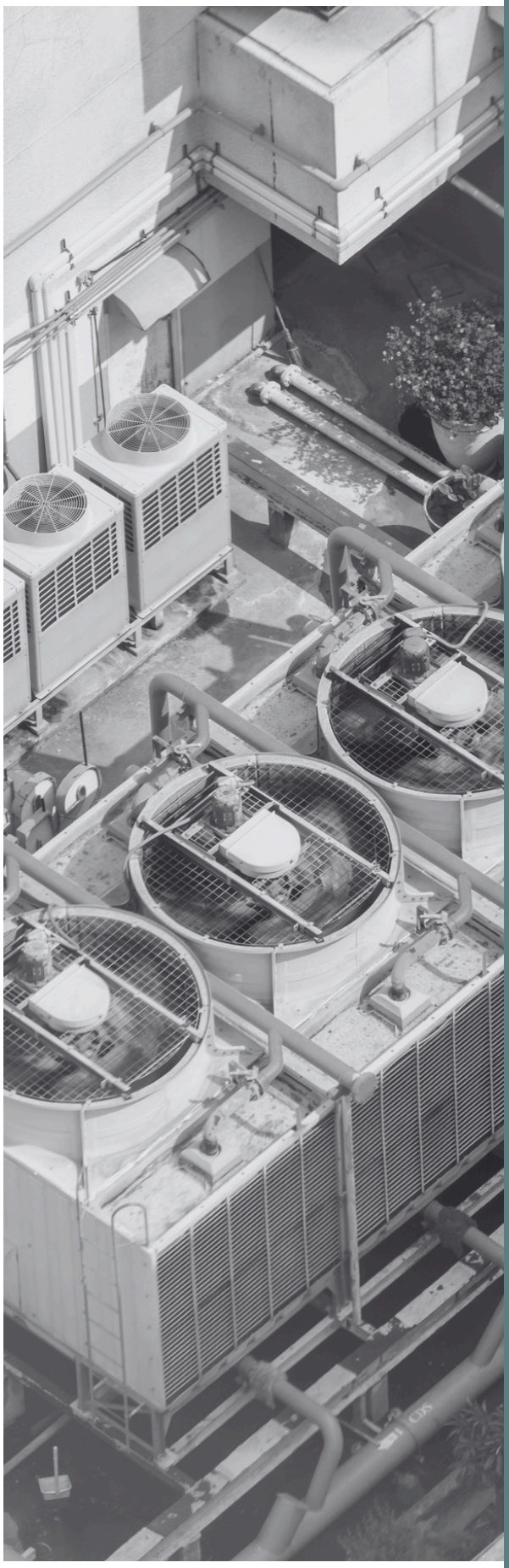

CAPTUREH2O

Cooling Water Treatment Audit

Prepared By :

Capture H2O

Presented By :

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Goal: Improve WUE Ratio

Maximize Control

A

Minimize Consumption

C+

Water Savings

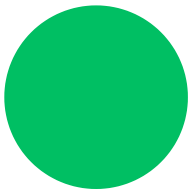
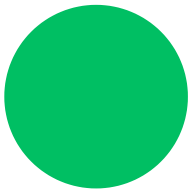
10.04m gallons per year

Cost Savings

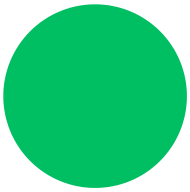
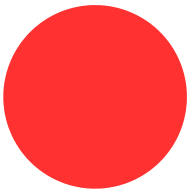
$197,941 per year

CAPTUREH2O

Maximize Control

Hazard	Score	Reason	Recommendation
Scale		Tower hardness is being well managed. Minor scale buildup identified on drift eliminators.	The High Cycle Program can utilize soft water and remove building blocks for scale. The Hybrid program can utilize an oscillating coaxial magnetic field to control the precipitation of scaling ions on equipment. Both programs can control scale without chemicals.
Corrosion		Corrosion coupons were identified on each tower's sample line, and no issues were reported by facility personnel.	Ensure corrosion inhibitor is being fed and corrosion rates are being monitored. The High Cycle Program will remove the need for corrosion inhibitors, and utilize the natural silica in the water for corrosion control. The Hybrid program will induce high electric current flow throughout the system, reducing the reliance on chemicals.
Bacteria		No bacteria issues reported by facility personnel, however minor algae growth was identified in the cooling towers and biocide feed was not identified on site.	Implement a dual biocide feed. The High Cycle Program will remove the need for biocides and utilize high pH and high conductivity tower water to naturally control bacterial growth. The Hybrid program will apply osmotic pressure to bacteria, reducing the reliance on chemicals.

Minimize Consumption

Resource	Score	Reason	Recommendation
Water		The cooling tower systems operate at 3-4 cycles of concentration. Makeup and blowdown metering is present, but is not automated and is read manually on a monthly basis. System also prioritizes reclaimed water for makeup and supplementing with city water when unavailable.	Automating the water meters will provide more system visibility and identify water wastage to address mechanical issues promptly. The High Cycle and Hybrid Programs will save water by increasing cycles of concentration and reduce city water consumption.
Energy		Tower hardness is being well managed. Minor scale buildup identified on drift eliminators. Side stream filtration is present and the system is clean, however filter backwash frequency and control are unknown.	The High Cycle and Hybrid Programs prevent the deposition of scale, improving heat transfer efficiency and lowering energy consumption when compared to a traditional chemical treatment program.
Chemical		The system was identified to be feeding both defoamer and sulfuric acid. No other chemicals were identified on the site walk.	Installing automated water meters on the blowdown lines will allow for a post-bleed chemical feed approach, optimizing chemical feed. The High Cycle and Hybrid Programs create a bacteria resistant environment, eliminating hazardous chemicals like sulfuric acid.

Current State

Background

This NorCal Data Center company is exploring ways to reduce their water and chemical consumption throughout their portfolio. This report is specifically regarding the cooling systems at their Northern California data center.

Analysis of Current Situation

The NorCal Data Center is one of the largest wholesale data center footprints in Silicon Valley, serving cloud providers, enterprises, hyperscalers, and other customers needing scalable and resilient infrastructure. There is approximately 77 MW of crticial IT load across the facilities. The cooling system being evaluated in this proposal consists of two cooling tower systems totaling 8,758 tons of cooling.

Currently, each system is operating on a traditional liquid chemical water treatment program. This program feeds a scale inhibitor and oxidizing biocide to control scale and bacteria growth. The only chemicals readily identifiable on site were sulfuric acid for pH control and defoamer, however it is expected that scale and corrosion inhibitors, as well as biocides are being fed as part of the treatment program. The systems are currently operating at 3.5 cycles of concentration, consuming 40.8 million gallons of makeup 11.7 million gallons of blowdown annually. The system is also utilizing a blend of reclaimed and city water for makeup, prioritizing the use of reclaimed water and supplementing with city water when reclaimed is unavailable.

Makeup and blowdown submetering were identified on the system, however the meters are old and site personnel expressed doubts in their accuracy. They are also manually recorded on a monthly basis, and not automated.

Desired Outcomes

The Capture H2O High Cycle Program can substantially reduce cooling tower blowdown and provide world class scale, corrosion, and bacteria control, all while feeding minimal to no water treatment chemicals. By operating at 25 cycles, we project that this program will reduce the annual system blowdown from 11.7 million gallons to 1.2 million gallons.

The Capture H2O Hybrid Program can substantially reduce cooling tower blowdown and provide world class scale, corrosion, and bacteria control, while reducing chemical to feed by up to 80% and removing the need for sulfuric acid to achieve higher cycles. By operating at 15 cycles, we project that this program will reduce the annual system blowdown from 11.7 million gallons to 2.1 million gallons.

As part of implementing this program, automated water meters will be installed on each cooling tower's blowdown line which will give more visibility into water usage and disposal at the site, as well as provide the opportunity to implement a post-bleed chemical feed, optimizing chemical consumption with the Hybrid Program.

Cost/Savings Analysis Design

This document summarizes the estimated water and financial savings potential for the NorCal Data Center cooling tower systems by transitioning to the Capture H_2O High Cycle and Hybrid cooling tower water treatment programs. These programs can significantly reduce the operating costs of cooling tower systems by:

1. Raising the Cycles of Concentration (CoC) to reduce makeup and blowdown water consumption.
2. Reducing or eliminating the need to feed chemicals by using alternative means to control scale, corrosion and bacteria.
2. Repurposing alternative sources such as reclaimed water for cooling tower makeup, displacing potable water use.

The savings analyses presented below are based on water rates, sewer rates, recycled water rates, cooling system design specifications, and current water chemistries provided by NorCal Data Center. The service and chemical costs were not provided.

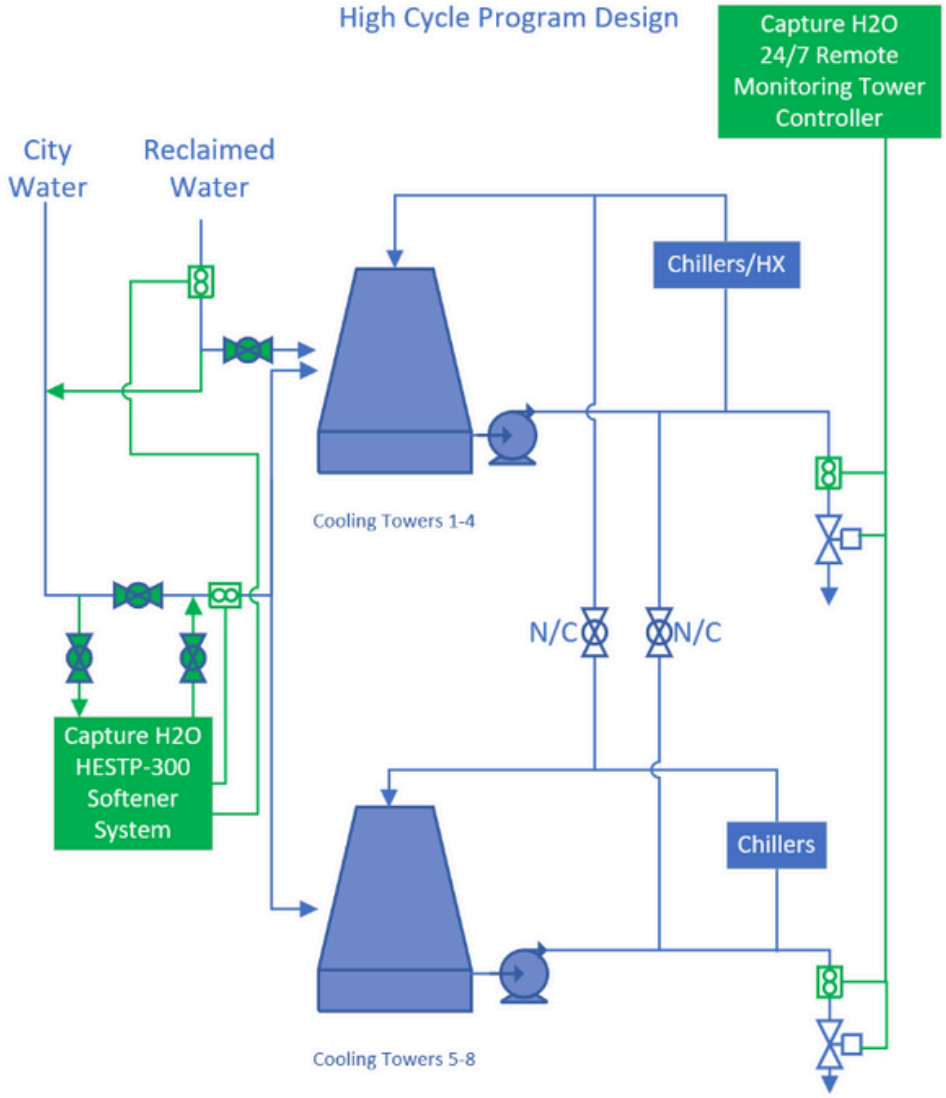
Water Cost ($/HCF)	Reclaimed Water Cost ($/kgal)	Sewer Cost ($/kgal)	Design Tonnage	Current CoC	Hybrid CoC	High Cycle CoC
$9.89	$5.43	$6.85	8,758	3.5	15	25

While the current cooling tower service and chemical costs influence the potential savings, these analyses suggest that the High Cycle and Hybrid programs will have a return on investment of 27 months and 13 months, respectively.

Note these ROIs do not account for current program service and chemical costs or Capture H2O service cost. The blend between city and reclaimed water makeup was also not provided, so this payback is based solely on reducing city water consumption. If the program costs and water volumes can be provided, a firmer ROI can be calculated.

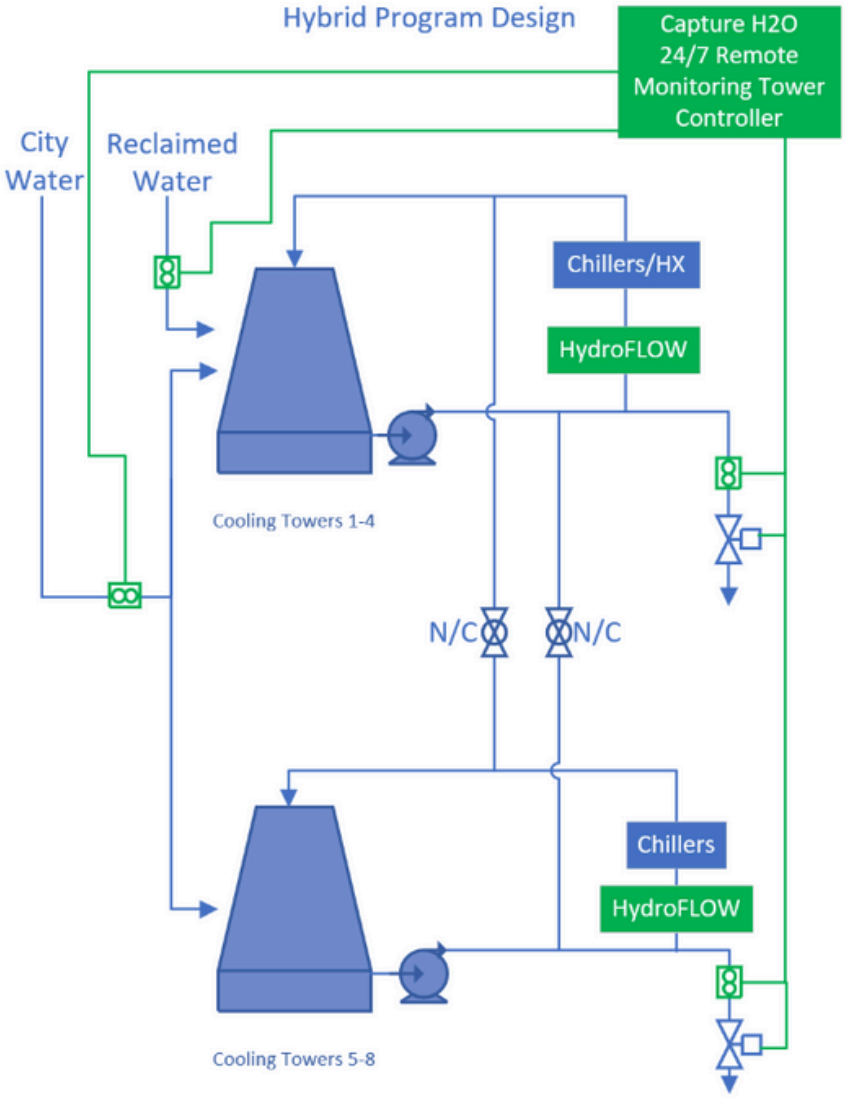
The next step is a site visit to verify the assumptions, understand the site constraints (i.e., available footprint and plumbing code requirements), and develop a preliminary design and savings projection to present to NorCal Data Center.

High Cycle Program Design



High Cycle Program ROM Equipment and Install Cost = $450,000								
Average Load (Tons)	Current Annual Water Use (gallons)	CH2O Annual Water Use (Gallons)	CH2O Annual Regeneration Water (Gallons)	Annual Water Savings (Gallons)	Annual Water Savings ($)	Annual Salt Cost ($)	Annual Savings ($)	Payback (Months)
2,218	40,800,000	30,357,143	407,593	10,035,264	$224,586	($26,645)	$197,941	27

Hybrid Program Design



CAPTURE H2O

New Equipment

Existing Equipment

Hybrid Program ROM Equipment and Install Cost = $233,000								
Average Load (Tons)	Current Annual Water Use (gallons)	CH2O Annual Water Use (Gallons)	CH2O Annual Regeneration Water (Gallons)	Annual Water Savings (Gallons)	Annual Water Savings ($)	Annual Salt Cost ($)	Annual Savings ($)	Payback (Months)
2,218	40,800,000	31,224,490	0	9,575,510	$214,297	$0	$214,297	13

Savings Summary

- Current Cooling Tower Cycles = 3.5
- Makeup Water Cost = $9.89 per HCF
- Sewer Cost = $6.85 per HCF
- Reclaimed Water Cost = $5.43 per HCF
- Annual CUP Consumption = 40.8M GPY
- Current Service and Chemical Program Costs = unknown

Assumptions to Verify:

- Will an air gap (i.e., storage tank + pumps) be necessary for reclaimed water tie in to city water, or will tying in downstream backflow preventers suffice?
- Blend between city and reclaimed water makeup. Conservatively assuming no change in blend, but if demand decreases, reclaimed percentage will presumably increase.
- Current Service + Chemical Program Costs

CAPTURE H2O

Save money. Save water. Save the planet.

Cooling Water Conservation

The Average Capture H_2O Customer Saves...

9.6M *Gallons of Water*

$60K *in Total Savings*

Per Year

Our Clients

Google pepsi Westfield CORDIA WESTPAK

Capture H_2O Solution Types

Category	Liquid Chemical	Solid Chemical	Hybrid	High Cycle
Cycles Water	2-10 0% 3 - 5, Most	2-10 0% 3 - 5, Most	Double Current 10 - 40%	40+ 25 - 50% Minimal
Savings	Dangerous, Water Consumption = High	Increased Safety, More Sustainable, Remote Monitoring	Less Increased Safety, Increased Water Savings, Remote Monitoring	Optimal Water Savings, Increased Safety, Alternative Water Sources
Chemicals				
Value				750+ Tons, Engaged Onsite Team, CAPEX
Typical Fit	Status Quo	Minimal CAPEX	250 - 750 tons, CAPEX	

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